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Revision of *Taiwanaenidea* Kimoto, 1984 (Coleoptera: Chrysomelidae: Galerucinae)

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Abstract

The genus *Taiwanaenidea* Kimoto, 1984 is a little-known galerucine genus known only with original description, which lacks illustrations. A number of specimens belonging to this genus are now available for study with effective collection made by Taiwan Chrysomelid Research Team. Two new species, *T. cheni* Lee and Beenen **sp. nov.** and *T. jungchangi* Lee and Beenen **sp. nov.** are here described. The other two known species, *T. collaris* Kimoto, 1984 and *T. strigosa* Kimoto, 1984 are reviewed and illustrations of diagnostic characters are presented. A key to all species of this genus is provided.

Keywords: Endophallus, Taiwan, taxonomic revision, *Alnus formosana*, *Fagus hayatae*

Introduction

The genus *Taiwanaenidea* is endemic to Taiwan. It was described by Kimoto (1984) for two species, *T. collaris* Kimoto and *T. strigosa* Kimoto. No additional records or notes have been published since. Researchers of the Taiwan Agricultural Research Institute (TARI) had been collecting insects with sweeping and Malaise traps from 1979–1988. Approximately 60000 leaf beetles were preserved at the historic collection of TARI. However, only ten specimens of *Taiwanaenidea collaris* Kimoto, 1984 were found among them. This result may indicate that members of this genus are not common.

The Taiwan Chrysomelid Research Team (TCRT) was formed in 2005 and is composed of 10 members. Most are amateurs aiming to make an inventory of all species of Chrysomelidae in Taiwan. Based on material collected by this team, we found that adults of this genus appear during spring and feed on tender leaves of host plants, including *Alnus formosana* for most *Taiwanaenidea* species (Figs 2–5). Because their host plants always are large trees, effective collection is possible by sweeping leaves of host plants during spring season with extendable insect nets (Fig. 1). Approximately 300 specimens had been collected and made available for study.

Materials and Methods

To prepare drawings of the adult reproductive systems, the abdomens of adults were separated and boiled in a 10% KOH solution, cleared in distilled water, and then mounted on microscope slides in glycerin for observation. Specimens were examined and drawings were made using a Leica M165 stereomicroscope. Microscope slides were examined and illustrated using a Nikon ECLIPSE 50i microscope. Body parts were then stored in glycerin tubes with the dry mounted specimens.

Host plants are recorded by observing adult feeding behavior in the field. Plants were identified by Chih-Kai Yang.

Specimens examined are deposited at the following institutes and museums, KMNH: Kitakyushu Museum of Natural History and Human History, Kitakyushu, Japan; OMNH: Osaka Museum of Natural History, Osaka, Japan; RBCN: Ron Beenen collection, Nieuwegein, The Netherlands; TARI: Taiwan Agricultural Research Institute, Taichung, Taiwan.

Exact label data are cited for all type specimens of the described species; a double slash (//) divides the data on

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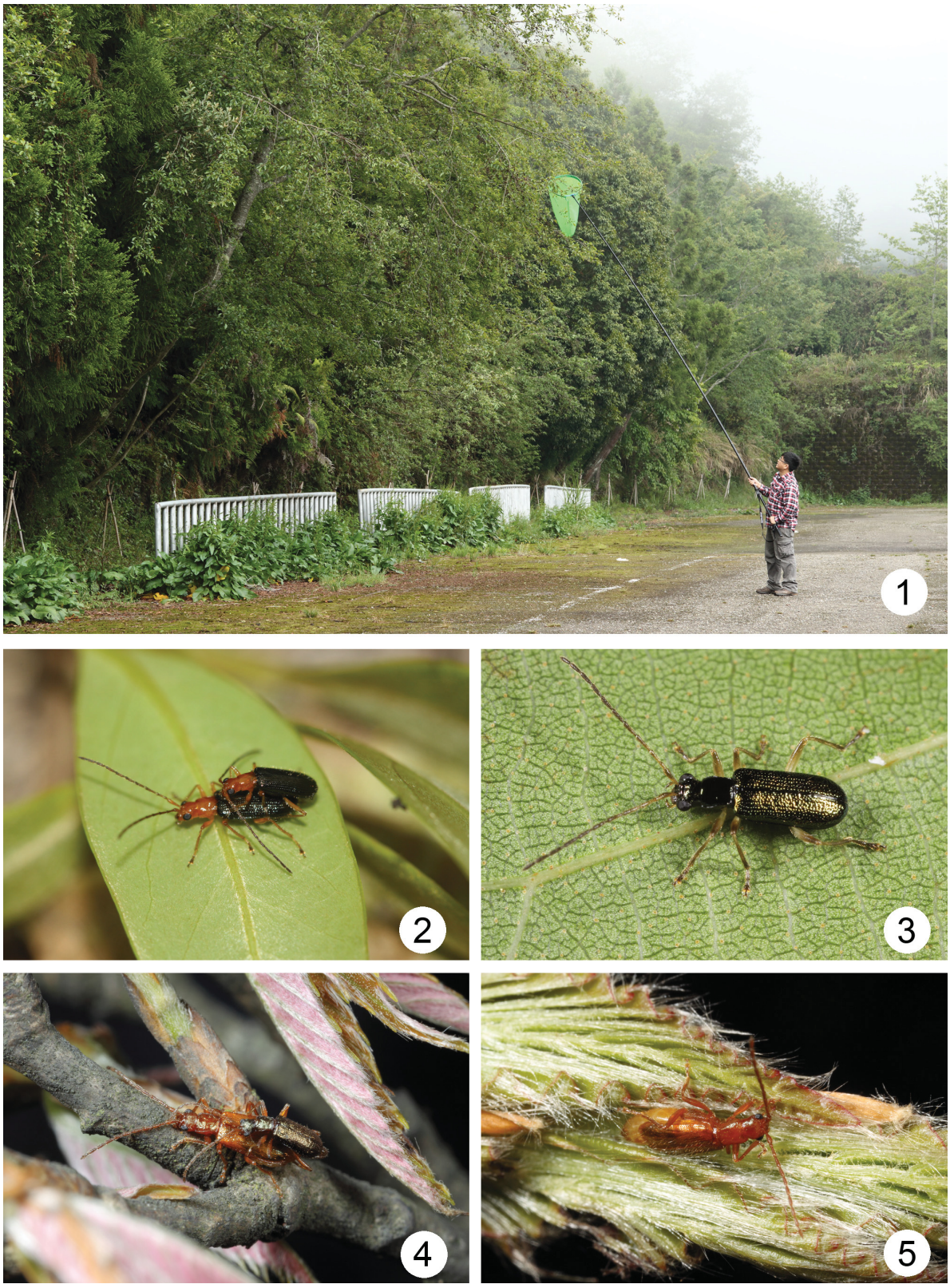
different labels and a single slash (/) divides the data in different rows. Other comments and remarks are in square brackets: [p] – preceding data are printed, [h] – preceding data are handwritten, [w] – white label, [y] – yellow label, [b] – blue label, and [r] – red label.



FIGURES 1–5. Ecological photography. 1. Collecting adults of *Taiwanaenidea* by sweeping tender leaves of *Alnus formosana* with extendable insect net; 2. A male of *T. cheni* sp. nov., attempting to mate with female; 3. A male of *T. collaris*; 4. A male of *T. strigosa* attempting to mate with female; 5. A female of *T. strigosa* coming out from tender leaves of *Fagus hayatae*.

Genus *Taiwanaenidea* Kimoto

Taiwanaenidea Kimoto, 1984: 50 (type species *Taiwanaenidea strigosa* Kimoto, 1984)

The genus is among Luperini defined by the following characteristics: legs with appendiculate claws; the posterior tibia lack an apical spine and have metatarsi with first segment shorter than the subsequent combined. The anterior coxal cavities are closed posteriorly. The pronotum has two shallow impressions and the basal and lateral borders are clearly margined; the front border shows only a minute margin. The elytra have clear humeri and are sparsely covered with fine and long setae.

Kimoto (1984) compared the genus with *Hoplosaenidea* Laboissière, 1933 but fails to refer to the resemblance to *Theopea* Baly, 1864. *Taiwanaenidea* lacks the apical spine on the posterior tibia which is evident in the other two genera. *Hoplosaenidea* has elytra confusedly punctured; in both *Taiwananidea* and *Theopea* the punctures are more or less arranged in rows: very regular in *Theopea* and especially on the sutural part of the elytra less regular in *Taiwanaenidea*.

Key to species of the genus *Taiwanaenidea*

Head and pronotum shining, without micro-reticulation 2
Head and pronotum dull, with micro-reticulation 3
Head, prothorax, and elytra bluish or greenish bronze, except few females with yellowish head and prothorax ..... *T. collaris* Kimoto, 1984
Head and prothorax reddish brown; elytra blackish metallic .... *T. cheni* sp. nov.
Elytra shining, without micro-reticulation ..... *T. jungchangi* sp. nov.
Elytra dull, with micro-reticulation ..... *T. strigosa* Kimoto, 1984

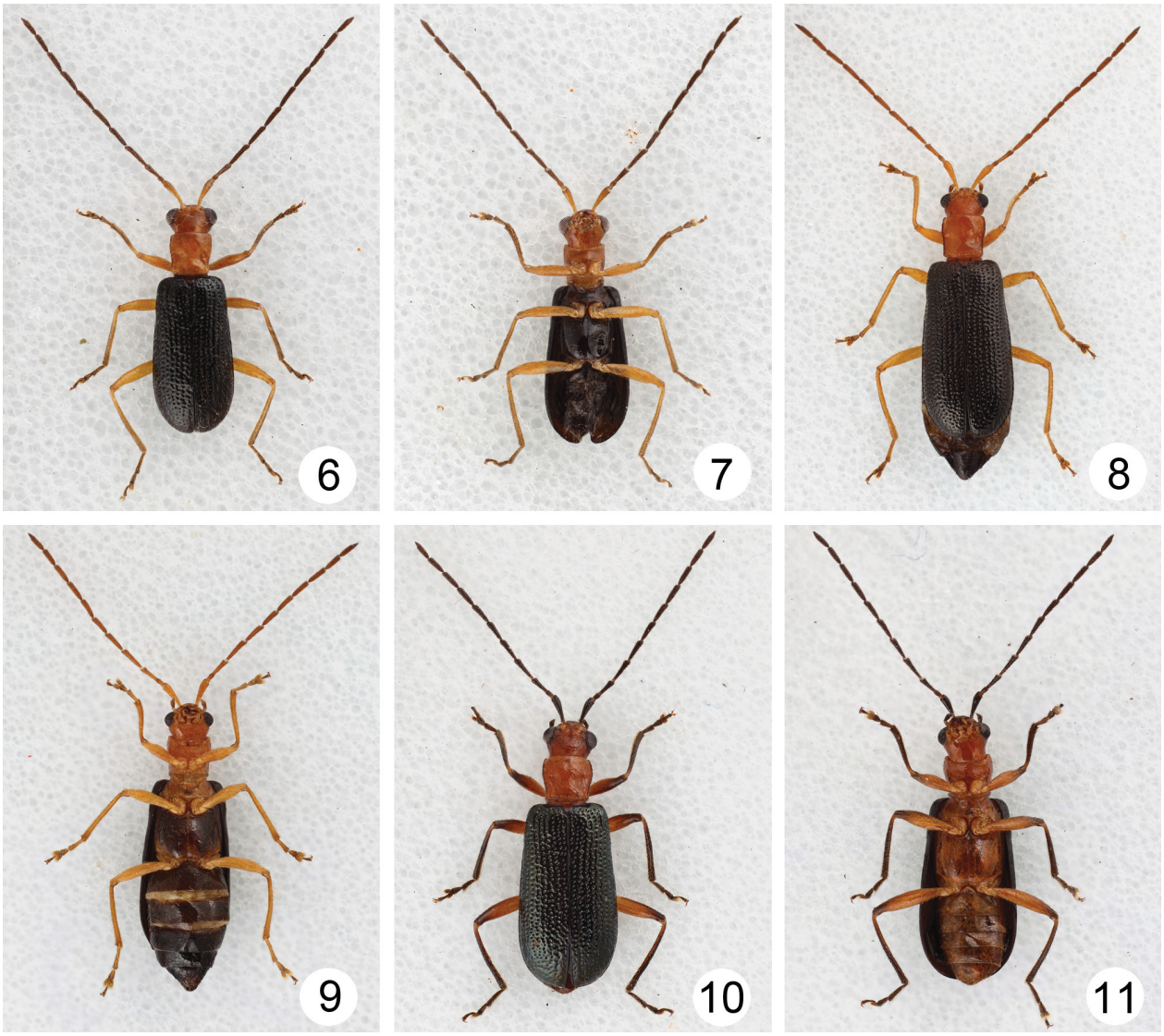
Taiwanaenidea cheni Lee and Beenen, sp. nov.

(Figs 2, 6–19)

Type locality. Taiwan: Pingtung county, Peitawushan (北大武山), 22°37'N, 120°43'E, 1700 m.

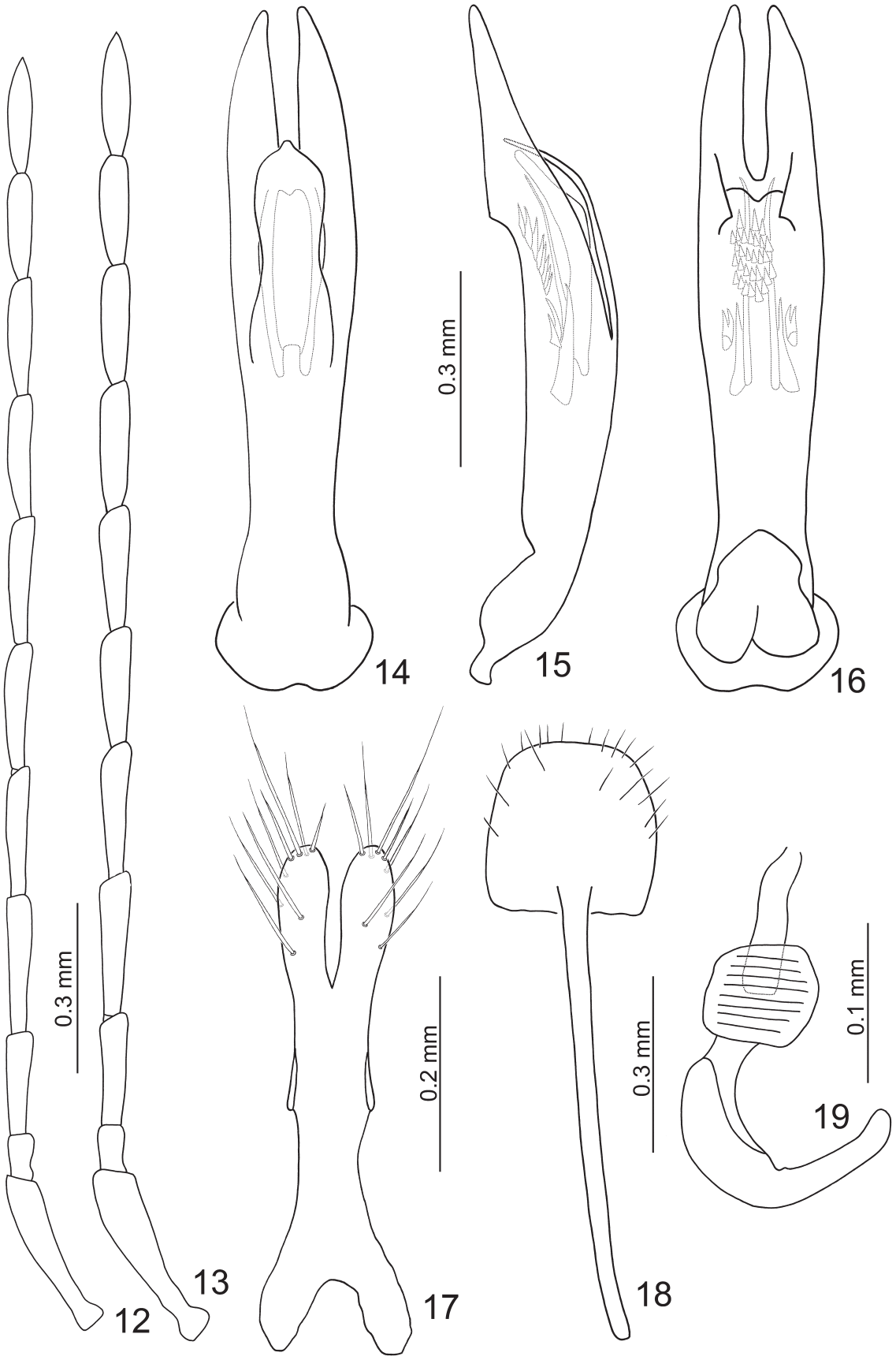
Type material (n= 62). Holotype ♂: "Taiwan: Pingtung (13226) / Peitawushan (北大武山) / 29.VII.2009, leg. J.-C. Chen [p, w]" (TARI). Paratypes: 6♂♂ (TARI), same as holotype but with "13227-13232"; 3♂♂, 7♀♀: "Taiwan: Pingtung / Peitawushan (北大武山) / 11.VIII.2013, leg. Y.-T. Chung [p, w]" (TARI); 3♀♀: "Taiwan: Pingtung / Peitawushan (北大武山) / 15.VIII.2013, leg. Y.-T. Chung [p, w]" (TARI); 6♀♀: "Taiwan: Pingtung / Peitawushan (北大武山) / 19.VIII.2013, leg. Y.-T. Chung [p, w]" (TARI); 1♀: "Taiwan: Pingtung / Peitawushan (北大武山) / 27.VIII.2013, leg. Y.-T. Chung [p, w]" (TARI)' 1♀: "Taiwan: Pingtung (#16072) / Tahanlintao (大漢林道) / 9.VI.2010, leg. J.-C. Chen [p, w]" (TARI); 5♂♂, 2♀♀: "Taiwan: Pingtung (18784-18790) / Tahanlintao (大漢林道) / 05.IV.2011, leg. J.-C. Chen [p, w]" (RBCN); 1♂, 1♀: "Taiwan: Pingtung (18964–18965) / Tahanlintao (大漢林道) / 9.VI.2010, leg. J.-C. Chen [p, w]" (TARI); 1♀: "Taiwan: Pingtung (22474) / Tahanlintao (大漢林道) / 10.IV.2012, leg. J.-C. Chen [p, w]" (TARI); 1♂: "Taiwan: Pingtung (22633) / Tahanshan (大漢山) / 28.IV.2012, leg. M.-H. Tsou [p, w]" (TARI); 1♂: "Taiwan: Pingtung / Tahanshan (大漢山) / 14.III.2013, leg. Y.-T. Chung [p, w]" (TARI); 1♀: "Taiwan: Pingtung / Tahanshan (大漢山) / 10.V.2013, leg. Y.-T. Chung [p, w]" (TARI); 3♂♂, 2♀♀: "Taiwan: Pingtung / Tahanshan (大漢山) / 06.IV.2014, leg. Y.-T. Chung [p, w]" (TARI); 1♂: "Taiwan: Pingtung / Tahanshan (大漢山) / 02.IV.2015, leg. Y.-T. Chung [p, w]" (TARI); 11♂♂, 4♀♀: "Taiwan: Pingtung (22519–22533) / Jinshuiying (浸水營) / 12.IV.2012, leg. C.-F. Lee [p, w]" (TARI).

Differential diagnosis. *Taiwanaenidea cheni* sp. nov. is similar to *T. collaris* with shining dorsum that lacks micro-reticulation. But *T. cheni* sp. nov. displays a characteristic color pattern (reddish brown head and prothorax and black elytra) that is different from *T. collaris* (greenish or bluish bronze head, prothorax, and elytra). In addition, although main parts of the endophallic sclerites of both species are similar, the shapes and sizes of these sclerites are different between the species. The curve sclerites are directed outwards (directed inwards in *T. collaris*), a baso-lateral apophyses of the dorsal tube-like sclerite is present (simple basal opening in T. *collaris*), and the outer sclerites are well developed (reduced outer ones in *T. collaris*).

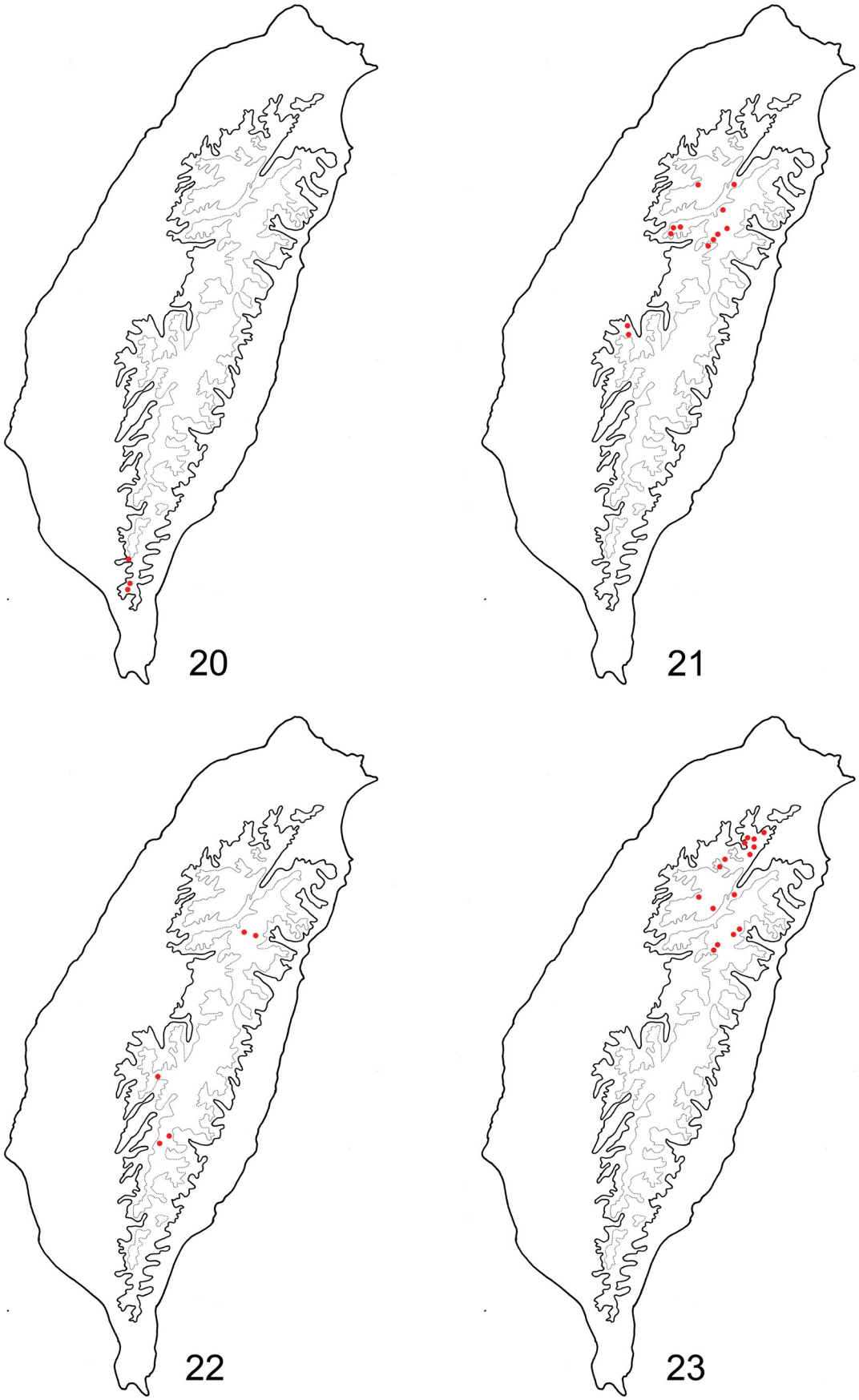


FIGURES 6–11. Habitus of *Taiwanaenidea cheni* sp. nov. 6. Male, dorsal view, collected from Tahanshan; 7. Ditto, ventral view; 8. Female, dorsal view, collected from Tahanshan; 9. Ditto, ventral view; 10. Female, dorsal view, collected from Peitawushan; 11. Ditto, ventral view.

Males. Length 4.2–5.9 mm, width 1.5–2.1 mm. General color (Figs 6–7) blackish metallic, head, pronotum, and leg yellowish brown. Discs of head, pronotum, and elytron smooth, without micro-reticulation. Head strongly constricted behind eye. Antenna (Fig. 12) filiform and extremely elongate, as long as body, antennomere III to X slightly curved, ratio of length of antennomeres III to XI about 1.0 : 1.3 : 1.2 : 1.2 : 1.2 : 1.2 : 1.2 : 1.0 : 1.1; ratio of length to width from antennomere III to XI about 3.8 : 5.1 : 5.3 : 5.3 : 5.3 : 5.2 : 5.2 : 4.5 : 4.9. Pronotum as long as wide, narrowed at middle. Elytra 1.9X longer than wide, parallel-sided. Tarsomeres I of front and middle legs normal. Median lobe of abdominal ventrite V rectangular, apical margin slightly convex. Penis (Figs 14–16) elongate, widest at apical 1/3, narrowed at apical 1/4, deeply bifurcate from apical 1/4 to apex, apically tapering, apex narrowly rounded; tectum well sclerotized, apex narrowly rounded; apex straight in lateral view, abruptly curved at apical 1/3; endophallus with two pairs of long and curved setae, one shorter and about 0.4X long as the other, longer one directed outwards, with one small, outer, well developed sclerite with two setae; ventrally covered with one piece of dense setae, dorsally covered with one elongate tube-like sclerite, with baso-laeral apophyses.



FIGURES 12–19. Diagnostic characters of *Taiwanaenidea cheni* sp. nov. 12. Antenna, male; 13. Antenna, female; 14. Penis, dorsal view; 15. Penis, lateral view; 16. Penis, ventral view; 17. Gonocoxae; 18. Abdominal ventrite VIII; 19. Spermatheca.



FIGURES 20–23. Distribution map of *Taiwanaenidea* species, solid line: 1000 m, broken line: 2000 m. 20. *T. cheni* sp. nov.; 21. *T. collaris* Kimoto, 1984; 22. *T. jungchangi* sp. nov.; 23. *T. strigosa* Kimoto, 1984.

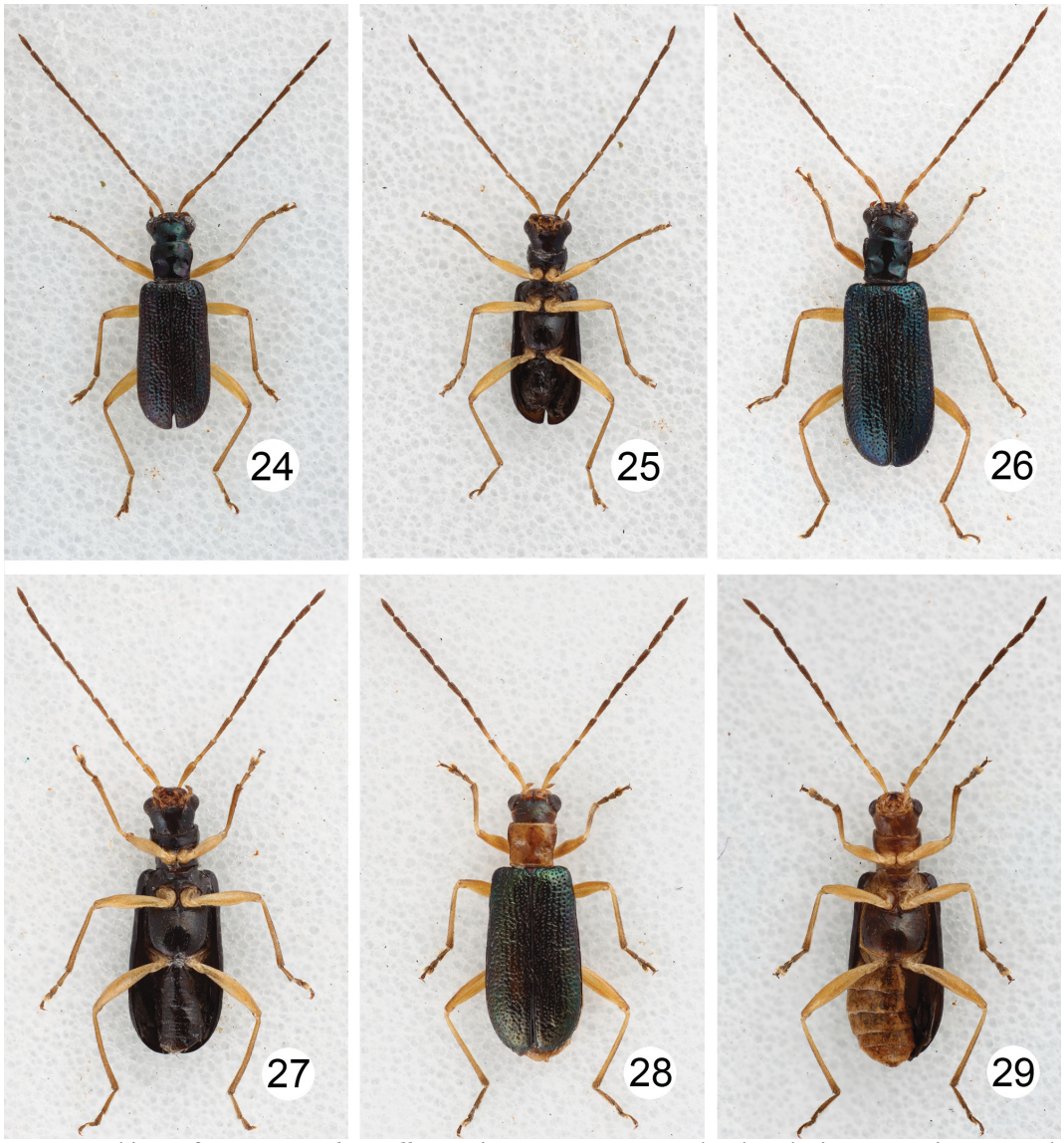
Females. Length 5.6–6.4 mm, width 1.9–2.3 mm. Similar to male (Figs 9–10), but head slightly constricted behind eyes. Antenna 0.9X long as body (Fig. 13); ratio of length of antennomeres III to XI about 1.0 : 1.3 : 1.2 : 1.0 : 1.1 : 1.1 : 1.0 : 1.0 : 1.1; ratio of length to width from antennomere III to XI about 3.7 : 4.8 : 4.4 : 3.8 : 4.1 : 4.2 : 4.1 : 4.1 : 4.4. Apical margin of abdominal ventrite V truncate. Gonocoxae (Fig. 17) slender, and combined together from basal 1/6 to apical 1/3, apex of each gonocoxa widely rounded, with eight long setae; widened at middle and slightly recurved; base wide. Ventrite VIII (Fig. 18) well sclerotized; apex wide, apical margin truncate; disc with several extremely long setae at sides, one row of long setae near apical margin and one row of short setae along apical margin; spiculum long. Spermathecal receptaculum (Fig. 19) strongly swollen, distinctly separated from pump; pump strongly curved, abruptly narrowed at base; spermathecal duct wide, deeply projecting into receptaculum.

Variation. Specimens collected from Peitawushan have darkened antenna, tarsi, tibia, and apex of femur, and yellowish brown meso- and metathoracic and abdominal ventrites (Fig. 11).

Host plants. Adults feed on a number of species belonging to Lauraceae, including *Cinnamomum insularimontanum* Hayata, *Persea philippinensis* (Merr.) Elmer, and *Machilus thunbergii* Sieb. & Zucc.

Distribution. Southern Taiwan. This new species is only known from two localities (Peitawushan and Tahanshan) in Pingtung County (Fig. 20).

Etymology. This new species is named after Mr. Jung-Chang Chen, who is a member of TCRT and the first to collect this new species.



FIGURES 24–29. Habitus of *Taiwanaenidea collaris* Kimoto, 1984. 24. Male, dorsal view; 25. Ditto, ventral view; 26. Female, dorsal view; 27. Ditto, ventral view; 28. Female, dorsal view, color variation; 29. Ditto, ventral view.

***Taiwanaenidea collaris* Kimoto, 1984**
(Figs 3, 24–37)

Taiwanaenidea collaris Kimoto, 1984: 52; Kimoto, 1989: 259 (additional records); Kimoto & Chu, 1996: 87 (list); Kimoto & Takizawa, 1997: 204 (redescription); Beenen, 2010: 488 (list).

Type locality. Nantou county, Meifeng (梅峰), 24°05'N, 121°10'E, 2100 m.

Type material. Paratypes: 1♀ (KMNH): "Lushan Wenchuan [廬山溫泉] / Natou Hsien / Taiwan / 7.VI.1976 / H. Makihara leg. [p, w] // *Taiwanaeindea* / *collaris* / Kimoto, n. sp. [h, w] // PARATYPE [p, b]"; 2♀♀ (KMNH): "(Taiwan) / Huanshan [環山] / Hsuenshan Mo [雪山山脈] / Taichung Hs. [p, w] // Jun 1. 1971 / K Kanmiya [p, w] / *Taiwanaeindea* / *collaris* / Kimoto, n. sp. [h, w] // PARATYPE [p, b] // PHOTO [only one specimen with this label; p, r]"; 1♀ (KMNH): "[TAIWAN] / Taotsua / nr Hotso [廬山溫泉] / Nantou Hsien [h, w] // 27.VI.1971 / Y. Miyatake [h, w] // *Taiwanaeindea* / *collaris* / Kimoto, n. sp. [h, w] // PARATYPE [p, b]".

Additional specimens examined (n= 80). TAIWAN. **Hsinchu**: 2♀♀, Kuanwu, 19.VIII.2009, leg. Y.-F. Hsu (TARI); 2♂♂, same locality, 30.VI.2010, leg. M.-H. Tsou (TARI); **Ilan**: 1♀, Suyuan, 29.VIII.2009, leg. Y.-L. Lin (TARI); **Nantou**: 1♀, Chingching, 27.VII.2013, leg. W.-C. Liao (TARI); 2♂♂, 2♀♀, Hsiaofengkou, 9VIII.2012, leg. C.-F. Lee (TARI); 5♂♂, 1♀, Hsitou, 15.VI.2011, leg. C.-F. Lee (TARI); 1♂, 1♀, Meifeng, 2-4.VI.1980, leg. L. Y. Chou & S. C. Lin (TARI); 1♂, same locality, 8.VI.1980, leg. K. S. Lin & B. H. Chen (RBCN); 4♂♂, 1♀, same locality, 24–26.VI.1981, leg. K. S. Lin & W. S. Tang (RBCN); 1♀, same locality, 28–29.VIII.1981, leg. L. Y. Chou & S. C. Lin (TARI); 2♀♀, same locality, 3.VII.2008, leg. M.-H. Tsou (TARI); 1♂, same locality, 17.VI.2010, leg. C.-F. Lee (TARI); 2♀♀, 25.VII.2014, leg. J.-C. Chen (TARI); 1♀, Shenmu, 17.V.2010, leg. Y.-T. Wang (TARI); 1♀, Tsuifeng, 25-27.VI.1981, leg. K. S. Lin & W. S. Tang (TARI); 17♂♂, 1♀, same locality, 26.VI.2012, leg. C-F. Lee (TARI); 7♂♂, 3♀♀, same locality, 11.VI.2014, leg. C.-F. Lee (TARI); **Taichung**: 1♀, Henglingshan, 5.VI.2012, leg. J.-C. Chen (TARI); 9♂♂, 6♀♀, Tashueshan, 7.VI.2010, leg. C.-F. Lee (TARI); 1♂, 1♀, Wuling, 27–29.VI.1979, leg. K. S. Lin & L. Y. Chou (TARI); 1♂, 2♀♀, Yuantsuishan, 16.VII.2010, leg. J.-C. Chen (TARI).

Differential diagnosis. See diagnosis of *Taiwanaenidea cheni* sp. nov.

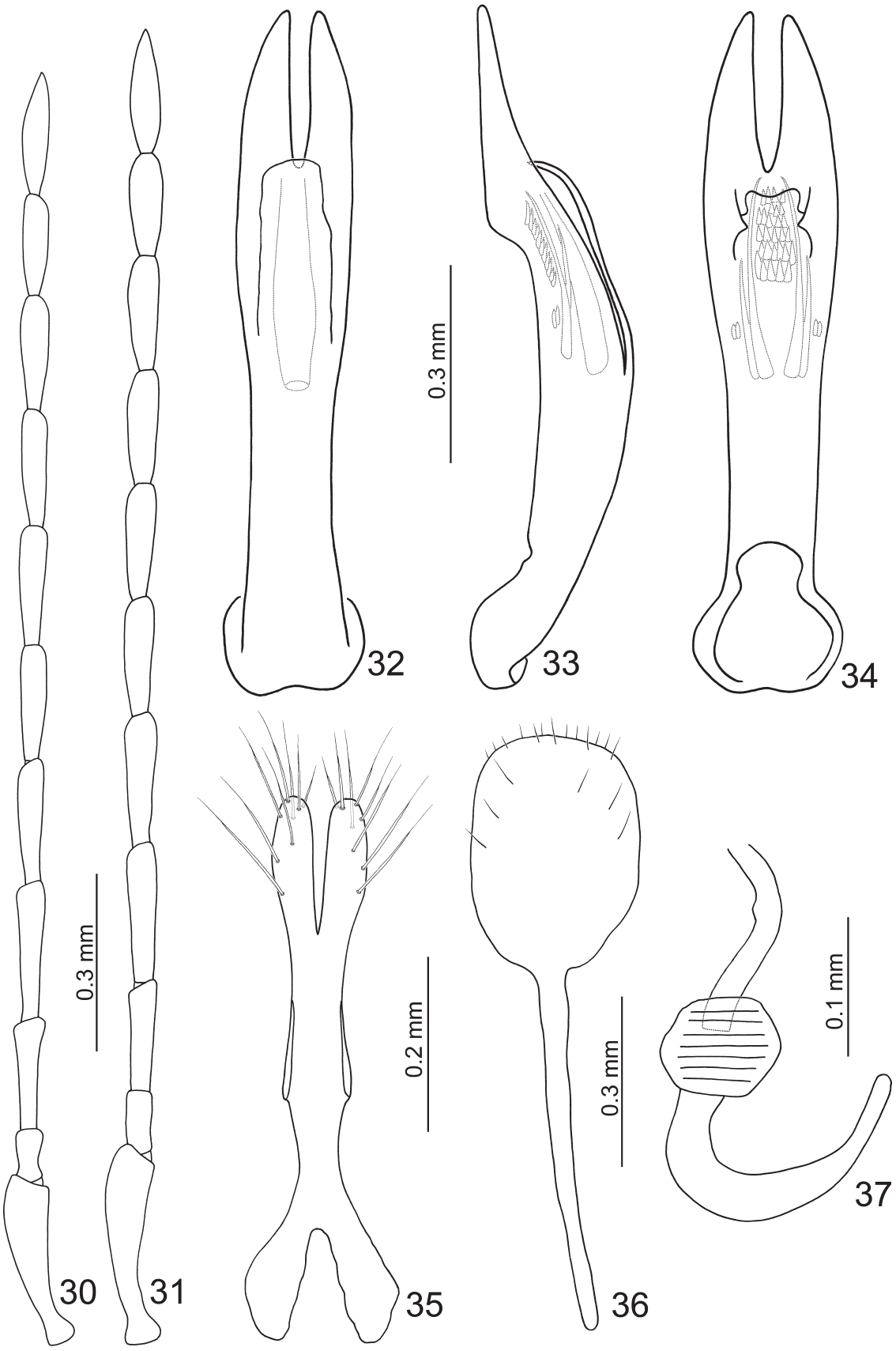
Males. Length 4.2–4.7 mm, width 1.5–1.6 mm. General color (Figs 24–25) greenish or bluish metallic, antenna and leg yellowish brown, antennomeres III or IV–XI darkened. Discs of head, pronotum, and elytron smooth, without micro-reticulation. Head strongly constricted behind eye. Antenna (Fig. 30) filiform and extremely elongate, as long as body, ratio of length of antennomeres III to XI about 1.0 : 1.3 : 1.2 : 1.1 : 1.1 : 1.1 : 1.1 : 0.9 : 1.2; ratio of length to width from antennomere III to XI about 3.2 : 4.3 : 4.7 : 4.4 : 4.4 : 4.4 : 4.4 : 4.0 : 4.7. Pronotum 0.9X longer than wide, narrowed at middle. Elytra 2.0X longer than wide, parallel-sided. Tarsomeres I of front and middle legs normal. Median lobe of abdominal ventrite V rectangular, apical margin straight. Penis (Figs 32–34) elongate, widest at apical 1/4, narrowed at middle, deeply bifurcate from apical 1/4 to apex, apically tapering, apex narrowly rounded; tectum well sclerotized, apex widely rounded; apex straight in lateral view, abruptly curved at apical 1/3; endophallus with two pairs of long and curved setae, one shorter and about half of another in length, longer one directed inwards, with a small outer sclerite with two teeth; ventrally covered with one piece of dense setae, dorsally covered with one elongate tube-like sclerite.

Females. Length 5.4–6.3 mm, width 2.2–2.5 mm. Similar to male (Figs 26–27), but head slightly constricted behind eyes. Antenna (Fig. 31) as long as body; ratio of length of antennomeres III to XI about 1.0 : 1.2 : 1.2 : 1.1 : 1.1 : 1.1 : 1.1 : 1.0 : 1.2; ratio of length to width from antennomere III to XI about 3.6 : 4.4 : 4.4 : 3.9 : 3.9 : 3.9 : 3.9 : 3.5 : 4.2. Apical margin of abdominal ventrite V truncate. Gonocoxae (Fig. 35) slender, and combined together from basal 1/4 to apical 1/4, apex of each gonocoxa widely rounded, with eight long setae; widened at middle and slightly recurved; base wide. Ventrite VIII (Fig. 36) well sclerotized; apex wide, apical margin truncate; disc with three pairs of extremely long setae at sides, one row of long setae near apical margin and one row of short setae along apical margin; spiculum long. Spermathecal receptaculum (Fig. 37) strongly swollen, distinctly separated from pump; pump strongly curved; spermathecal duct slender, deeply projecting into receptaculum.

Variation. Some females have brown or blackish brown heads and yellowish brown prothoraces (Figs 28–29).

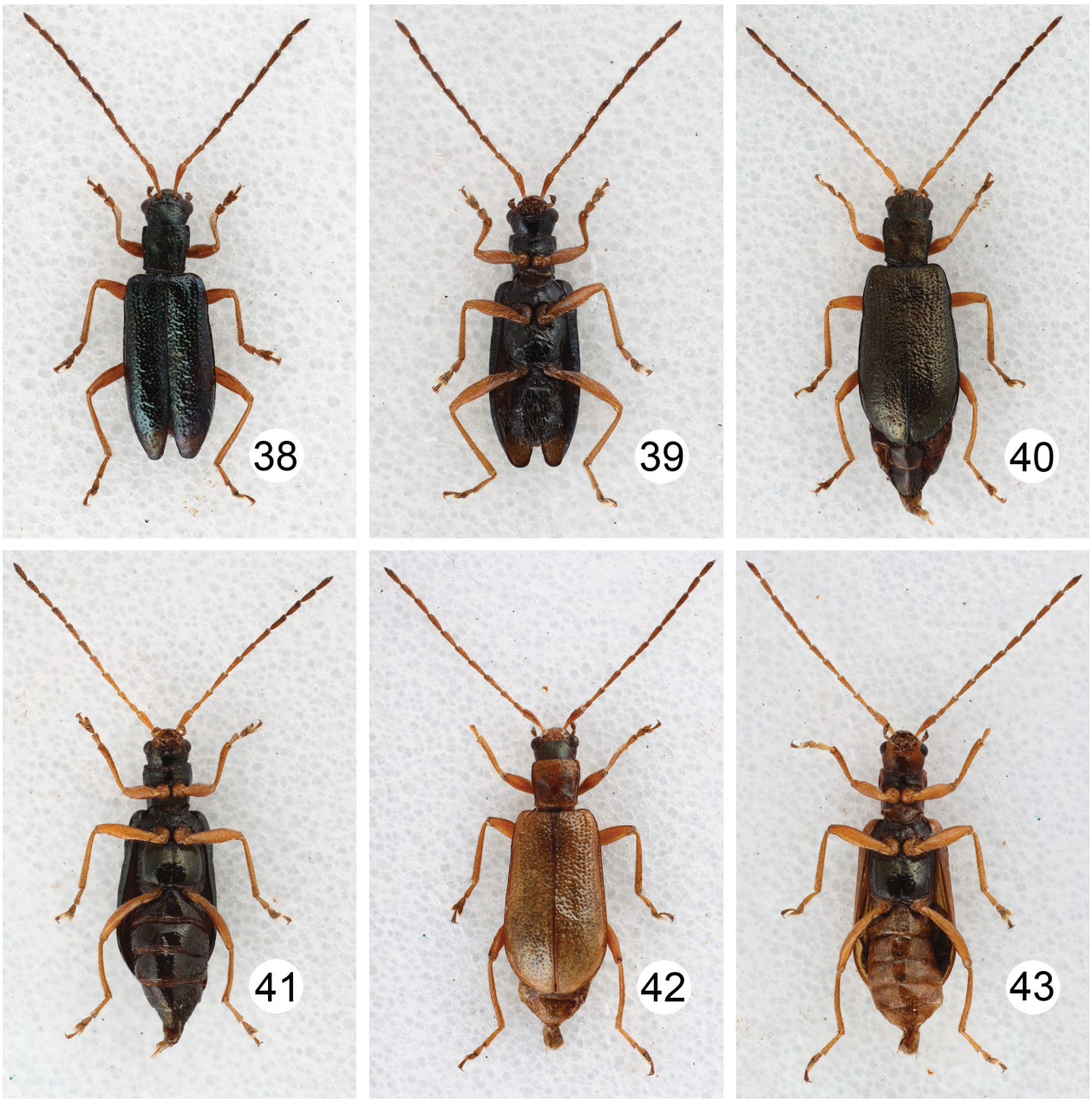
Host plant. *Alnus formosana* (Burkill ex Forbes & Hemsl.) Makino (Betulaceae).

Distribution. Central Taiwan (Fig. 21). *Taiwanaenidea collaris* is sympatric with *T. strigosa* in Kuanwu (Hsinchu County), Suyuan (Ilan County), Meifeng and Tsuifeng (Nantou County).



FIGURES 30–37. Diagnostic characters of *Taiwanaenidea collaris* Kimoto, 1984. 30. Antenna, male; 31. Antenna, female; 32. Penis, dorsal view; 33. Penis, lateral view; 34. Penis, ventral view; 35. Gonocoxae; 36. Abdominal ventrite VIII; 37. Spermatheca.

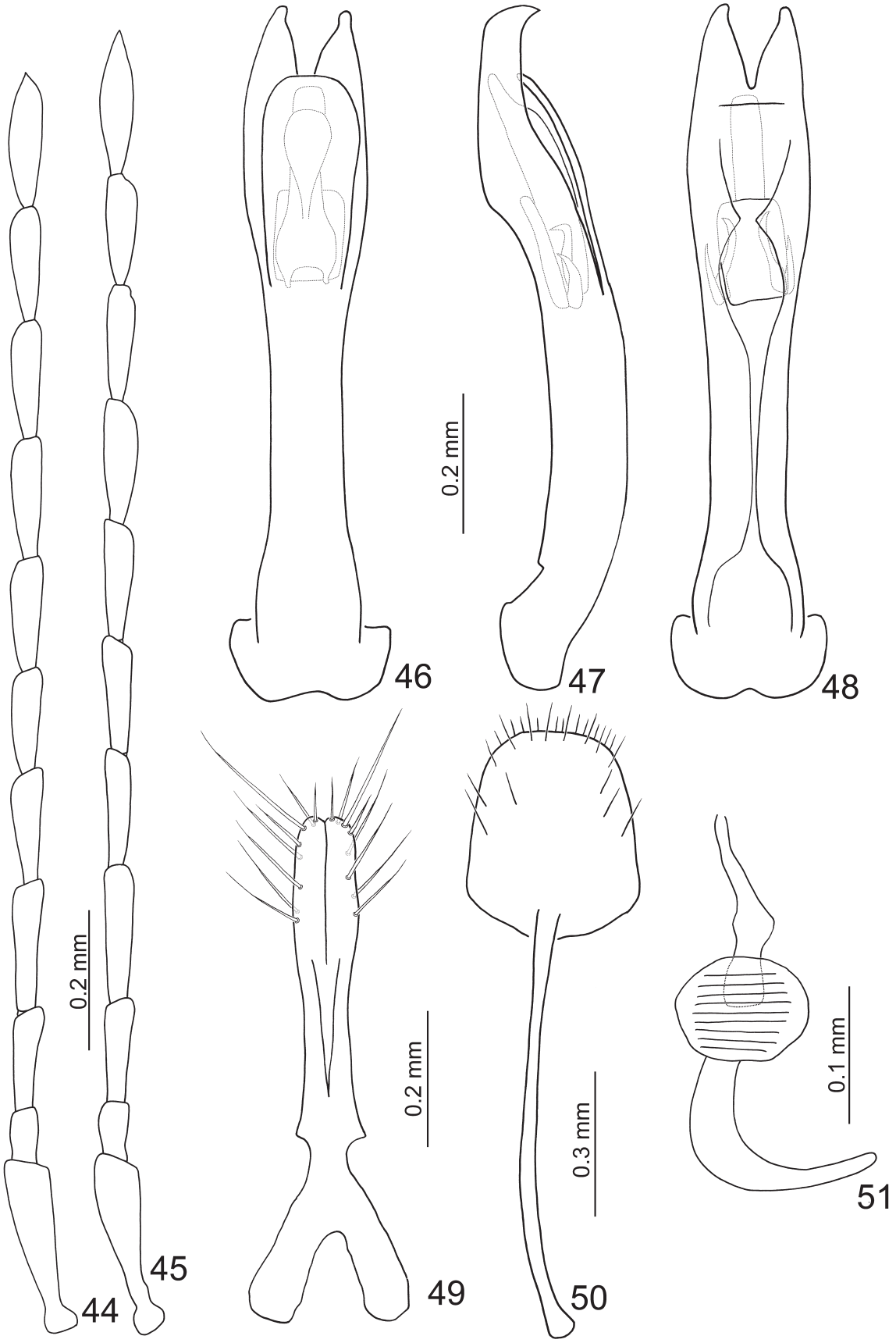
***Taiwanaenidea jungchangi* Lee and Beenen, sp. nov.**
(Figs 38–51)



FIGURES 38–43. Habitus of *Taiwanaenidea jungchangi* sp. nov. 38. Male, dorsal view; 39. Ditto, ventral view; 40. Female, dorsal view; 41. Ditto, ventral view; 42. Female, dorsal view, color variation; 43. Ditto, ventral view.

Type locality. Taitung county, Hsiangyang (向陽), 23°14'N, 120°59'E, 2300 m.

Type material (n= 14). Holotype ♂ (TARI): "Taiwan: Taitung (18712) / Hsiangyang (向陽) / 01.IV.2011, leg. J.-C. Chen [p, w]". Paratypes: 1♂ (TARI), same as holotype but with code number "18173"; 1♂, 2♀♀: "Taiwan: Taitung / Hsiangyang (向陽) / 28.III.2014, leg. W.-C. Huang [p, w]" (TARI); 1♀: "Taiwan: Taitung (#25185) / Hsiangyang (向陽) / 29.III.2014, leg. J.-C. Chen [p, w]" (TARI); 1♀: "Taiwan: Chiayi (#27306) / Tzuchung [自忠] / 08.V.2015, leg. J.-C. Chen [p, w]" (TARI); 1♀: "Taiwan: Taichung / Pilu [畢祿] / 22.IV.2015, leg. C.-F. Lee [p, w]" (TARI); 1♀: "TAIWAN: Hualien, Guanyuan (關原), alt. / 2200~2300m, 07.V.2006, / 24°11'12"N 121°20'00"E, leg. Y.-F. Hsu [p, w]" (TARI); 5♀♀: "Taiwan: Kaoshiung (#26840–26844) / Tienchih (天池) / 01.IV.2015, leg. C.-F. Lee [p, w]" (TARI, RBCN).



FIGURES 44–51. Diagnostic characters of *Taiwanaenidea jungchangi* sp. nov. 44. Antenna, male; 45. Antenna, female; 46. Penis, dorsal view; 47. Penis, lateral view; 48. Penis, ventral view; 49. Gonocoxae; 50. Abdominal ventrite VIII; 51. Spermatheca.

Differential diagnosis. *Taiwanaenidea jungchangi* sp. nov., is similar to *T. strigosa* with micro-reticulation on head and pronotum, but *T. jungchangi* sp. nov. has shining elytra that lacks micro-reticulation. This is different from *T. strigosa* which has micro-reticulation on the elytra. In addition, the aedeagus of *T. jungchangi* sp. nov. shows a number of differences from that of *T. strigosa* including the dorsally hook-like apices of aedeagus (straight apices in *T. strigosa*), endophallus with baso-lateral apophyses and short dorsal tube-like sclerite (lacking baso-lateral apophyses and long dorsal tube-like structure in *T. strigosa*), dorsally covered without any sclerite (short sclerite with two teeth in *T. strigosa*); two lateral, short, curved sclerites (sclerite lateral, elongate with two tapering apices in *T. strigosa*); absence of basal sclerite (presence of basal flat sclerite in *T. strigosa*).

Males. Length 3.8–4.5 mm, width 1.4–1.6 mm. General color (Figs 38–39) bluish bronze, antenna and leg yellowish brown, sometimes antenna darkened. Discs of head and pronotum with micro-reticulation. Head strongly constricted behind eye. Antenna (Fig. 44) filiform and 0.9X long as body, ratio of length of antennomeres III to XI about 1.0 : 1.4 : 1.1 : 1.0 : 1.1 : 1.2 : 1.2 : 1.1 : 1.4; ratio of length to width from antennomere III to XI about 3.4 : 4.4 : 3.5 : 3.2 : 3.4 : 3.7 : 3.7 : 3.6 : 4.1. Pronotum as long as wide, narrowed at middle. Elytra 1.9X longer than wide, parallel-sided. Tarsomeres I of front and middle legs swollen. Median lobe of abdominal ventrite V rectangular, apical margin slightly concave. Penis (Figs 46–48) elongate, widest at apical 1/4, narrowed at basal 2/5, deeply bifurcate from apical 1/4 to apex, apically tapering, apex acute and curved upwards; tectum well sclerotized, apex widely rounded; apex straight in lateral view, abruptly curved at apical 1/3; endophallus with one short, longitudinal, tube-like sclerite, with baso-laeral apophyses; laterally covered with two short setae, one much longer than the other, apex hook-like; ventrally covered with one flat sclerite.

Females. Length 4.8–5.2 mm, width 1.8–2.0 mm. Similar to male (Figs 40–41), but head slightly constricted behind eyes. Antenna (Fig. 45) 0.8X as long as body; ratio of length of antennomeres III to XI about 1.0 : 1.3 : 1.1 : 1.1 : 1.1 : 1.1 : 1.1 : 1.0 : 1.4; ratio of length to width from antennomere III to XI about 3.5 : 4.6 : 3.9 : 3.9 : 4.0 : 4.0 : 3.9 : 3.7 : 4.6. Apical margin of abdominal ventrite V truncate. Gonocoxae (Fig. 49) slender, and combined together from basal 1/3 to apical 1/5, apex of each gonocoxa widely rounded, with eight long setae; abruptly widened at basal 1/3; base wide. Ventrite VIII (Fig. 50) well sclerotized; apex wide, apical margin rounded; disc with three extremely long setae at each side, one row of long setae near apical margin and one row of short setae along apical margin; spiculum long. Spermathecal receptaculum (Fig. 51) strongly swollen, distinctly separated from pump; pump strongly curved; spermathecal duct slender, deeply projecting into receptaculum.

Variation. One female has yellowish bronze body but with dark brown head except frontal area and antenna (Figs 42–43).

Host plant. *Alnus formosana* (Burkill ex Forbes & Hemsl.) Makino (Betulaceae).

Distribution. Central and south Taiwan (Fig. 22). *Taiwanaenidea jungchangi* sp. nov. is a rare but widespread species. It is sympatric with *T. strigosa* in Kuanyuan (Hualien County).

Etymology. This new species is named after Mr. Jung-Chang Chen, who is a member of TCRT and the first to collect this new species.

Taiwanaenidea strigosa Kimoto, 1984

(Figs 4–5, 52–64)

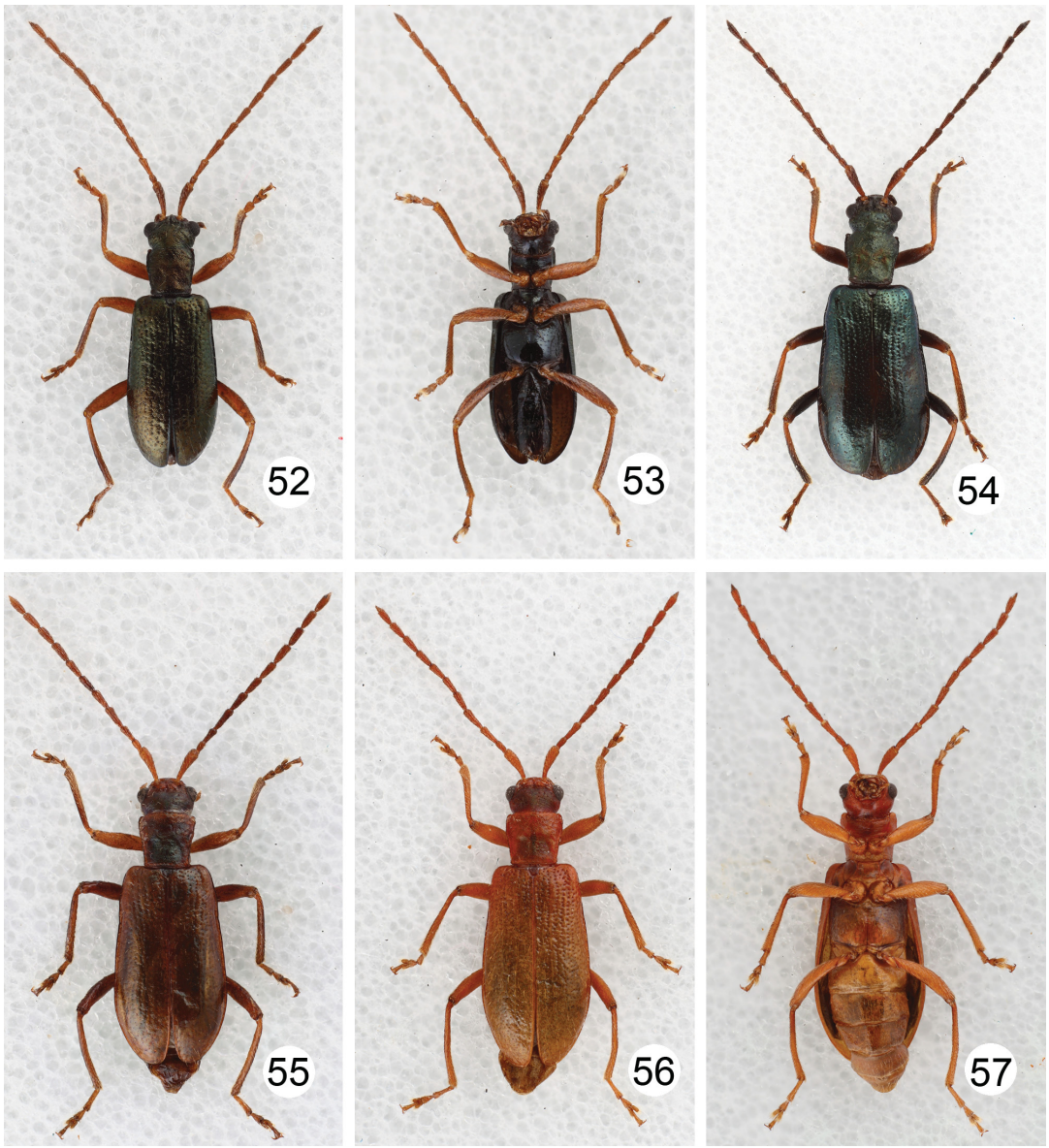
Taiwanaenidea strigosa Kimoto, 1984: 51; Kimoto & Chu, 1996: 87 (list); Kimoto & Takizawa 1997: 204 (redescription); Beenen, 2010: 488 (list).

Type locality. Taichung county, Lishan (梨山), 24°15'N, 121°14'E, 1800 m.

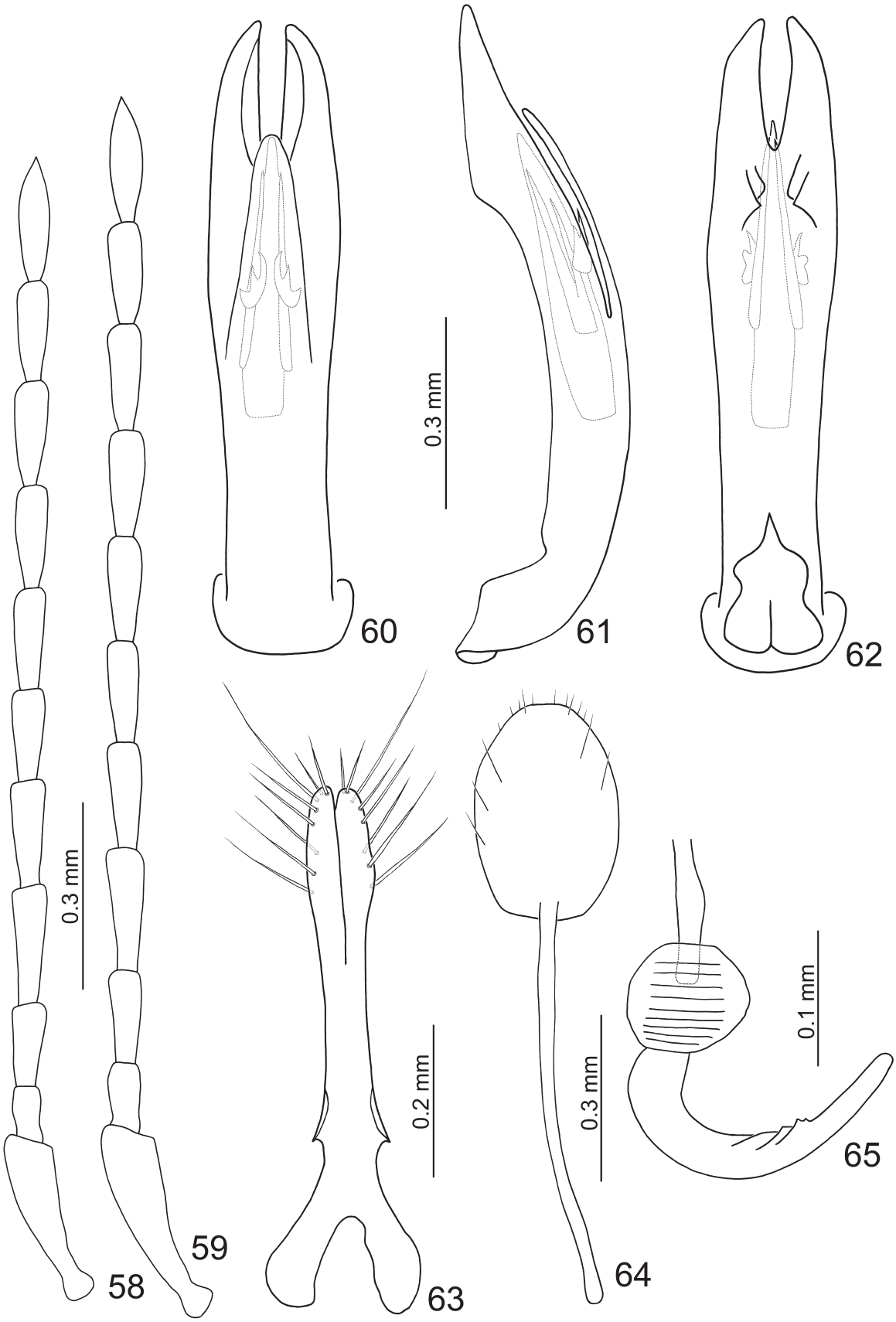
Type material. Holotype ♂ (OMNH): "Mt. LISHAN [梨山] / TAIWAN / 5.IV.1973 / Y. KIYOYAMA [p, y] // *Taiwanaenidea* / *strigosa* / Kimoto, n. sp. [h, w] // HOLOTYPE [p, r]". Paratypes: 1♀ (OMNH): "LISHAN [梨山] / TAIWAN / 29.III.1970 / H. NOMURA [p, y] // *Taiwanaenidea* / *strigosa* / Kimoto, n. sp. [h, w] // PARATYPE [p, b] // PHOTO [p, r]"; 1♀ (KMNH): "LISHAN [梨山] / TAIWAN / 31.III.1970 / H. NOMURA [p, y] // *Taiwanaenidea* / *strigosa* / Kimoto, n. sp. [h, w] // PARATYPE [p, b] // PHOTO [p, r]"; 1♂ (OMNH): "Mt. LISHAN [梨山] / TAIWAN / 4.IV.1973 / Y. KIYOYAMA [p, y] // *Taiwanaenidea* / *strigosa* / Kimoto, n. sp. [h, w] // PARATYPE [p, b]"; 1♂ (KMNH): "Mt. LISHAN [梨山] / TAIWAN / 5.IV.1973 / Y. KIYOYAMA [p, y] // *Taiwanaenidea* / *strigosa* / Kimoto, n. sp. [h, w] // PARATYPE [p, b]"; 3♀♀ (KMNH): "(FORMOSA) / Piluchi [碧綠溪] / Nantou Hisen / 30, IV 1982 / N. Ohbayashi leg. [p, w] // *Taiwanaenidea* / *strigosa* / Kimoto, n. sp. [h, w] / / PARATYPE [p, b]".

Additional specimens examined (n= 144). TAIWAN. **Hsinchu**: 1♀, Kuanwu, 30.IV.2010, leg. M.-H. Tsou (TARI); 1♂, Litungshan, 15.III.2009, leg. M.-H. Tsou (TARI); 2♀♀, same but with "leg. S.-F. Yu" (TARI); 4♀♀,

same locality, 20.III.2011, leg. M.-H. Tsou (TARI); 1♂, 1♀, Lupi, 4.IV.2009, leg. M.-H. Tsou (TARI); **Hualien**: 1♀, Kuanyuan, 17.V.2009, leg. M.-H. Tsou (TARI); 3♀♀, same locality, 23.IV.2015, leg. C.-F. Lee (TARI); 1♂, Pilu, 17.V.2009, leg. C.-F. Lee (TARI); 17♂♂, 8♀♀, same locality, 10.IV.2014, leg. C.-F. Lee (TARI); 2♀♀, same locality, 11.VI.2014, leg. C.-F. Lee (TARI); 4♀♀, same locality, 23.IV.2015, leg. C.-F. Lee (TARI); 1♀, same locality, 14.V.2015, leg. J.-C. Chen (TARI); **Ilan**: 1♀, Minchi, 5.IV.2009, leg. M.-H. Tsou (TARI); 1♀, same locality, 29.III.2015, leg. S.-F. Yu (TARI); 1♀, Suyuan, 28.IV.2009, leg. M.-H. Tsou (TARI); 1♂, 1♀, same locality, 9.IV.2011, leg. M.-H. Tsou (TARI); 1♂, 1♀, Yuanyanghu, 1.III.2010, leg. M.-L. Jeng (TARI); 1♀, same but with "11.III.2010" (TARI); **Nantou**: 2♂♂, 6♀♀, Meifeng, 20.IV.2011, leg. C.-F. Lee (RBCN); 26♂♂, 34♀♀, Tsuifeng, 9.IV.2014, leg. C.-F. Lee (TARI); 3♀♀, same locality, 21.IV.2015, leg. C.-F. Lee (TARI); **Taichung**: 3♀♀, Hsuehshan, 1-2.V.2012, leg. T.-H. Lee (TARI); **Taipei**: 3♂♂, 4♀♀, Chulushan, 25.III.2014, leg. T.-H. Lee (TARI); **Taoyuan**: 1♂, Hsuehwunao, 26.III.2011, leg. M.-H. Tsou (TARI); 1♂, same locality, 3.IV.2011, leg. M.-H. Tsou (TARI); 1♂, Lalashan, 8.III.2009, leg. H.-J. Chen (TARI); 1♀, same locality, 8.III.2009, leg. S.-F. Yu (TARI); 1♂, 1.IV.2009, leg. H.-F. Cheng (TARI); 2♀♀, 2.IV.2009, leg. C.-F. Lee (TARI); 1♀, Tamanshan, 2.V.2009, leg. M.-H. Tsou (TARI).



FIGURES 52–57. Habitus of *Taiwanaenidea strigosa* Kimoto, 1984. 52. Male, dorsal view; 53. Ditto, ventral view; 54. Female, dorsal view; 55. Female, dorsal view, color variation; 56. Female, dorsal view, color variation; 57. Ditto, ventral view.



FIGURES 58–65. Diagnostic characters of *Taiwanaenidea strigosa* Kimoto, 1984. 58. Antenna, male; 59. Antenna, female; 60. Penis, dorsal view; 61. Penis, lateral view; 62. Penis, ventral view; 63. Gonocoxae; 64. Abdominal ventrite VIII; 65. Spermatheca.

Differential diagnosis. See diagnosis of *Taiwanaenidea jungchangi* sp. nov.

Males. Length 3.5–3.8 mm, width 1.1–1.3 mm. General color (Figs 52–53) bluish bronze, antenna and leg brown or dark brown. Discs of head, pronotum, and elytron with micro-reticulation. Head strongly constricted behind eye. Antenna (Fig. 58) filiform and slender, as long as body, ratio of length of antennomeres III to XI about 1.0 : 1.4 : 1.3 : 1.1 : 1.2 : 1.2 : 1.3 : 1.2 : 1.5; ratio of length to width from antennomere III to XI about 2.4 : 3.5 : 3.2 : 2.8 : 3.1 : 3.1 : 3.2 : 3.0 : 3.8. Pronotum 0.9X longer than wide, narrowed at middle. Elytra 2.0–2.1X longer than wide, parallel-sided. Tarsomeres I of front and middle legs swollen. Median lobe of abdominal ventrite V rectangular, apical margin slight concave. Penis (Figs 60–62) elongate, widest at apical 1/3, narrowed at basal 1/3, deeply bifurcate from apical 1/4 to apex, apically tapering, apex narrowly rounded; tectum well sclerotized, apical tapering; apex straight in lateral view, abruptly curved at apical 1/3; endophallus with one large, longitudinal, tube-like sclerite, laterally covered with two long setae, basally combined together, one much longer than the other; dorso-laterally covered with one transverse sclerite and with two teeth.

Females. Length 4.5–5.3 mm, width 1.6–1.8 mm. Similar to male, but with yellowish bronze color (Figs 56–57), head slightly constricted behind eyes. Antenna 0.8X as long as body; ratio of length of antennomeres III to XI about 1.0 : 1.3 : 1.1 : 1.1 : 1.1 : 1.1 : 1.1 : 1.1 : 1.4; ratio of length to width from antennomere III to XI about 2.7 : 3.2 : 3.1 : 2.9 : 2.9 : 3.0 : 3.0 : 2.9 : 3.8. Apical margin of abdominal ventrite V truncate. Gonocoxae (Fig. 63) slender, and combined together from basal 1/3 to apical 1/5, apex of each gonocoxa widely rounded, with eight long setae; abruptly widened at basal 1/3, slightly recurved; base wide. Ventrite VIII (Fig. 64) well sclerotized; apex wide, apical margin rounded; disc with two or three extremely long setae at each side, two long setae near apical margin and one row of short setae along apical margin; spiculum long. Spermathecal receptaculum (Fig. 65) strongly swollen, distinctly separated from pump; pump strongly curved; spermathecal duct slender, deeply projecting into receptaculum.

Variation. Females collected from Nantou County and some of them from Hualien have darkened color (Fig. 55) or same color as males (Fig. 54).

Host plants. *Alnus formosana* (Burkill ex Forbes & Hemsl.) Makino (Betulaceae), *Fagus hayatae* Palib. ex Hayata (Fagaceae), *Pasania harlandii* (Hance) Oerst. (Fagaceae), and *P. hancei* (Benth.) Schottky (Fagaceae).

Distribution. North and central Taiwan (Fig. 23). *Taiwanaenidea strigosa* is sympatric with *T. collaris* in Kuanwu (Hsinchu County), Suyuan (Ilan County), Meifeng and Tsuifeng (Nantou County); with *T. strigosa* in Kuanyuan (Hualien County).

Discussion

Adults of *Taiwanaenidea* are uncommon in historical collections. However, members of TCRT have found that they always appear in spring to feed on host plants. Effective collection is possible by sweeping tender leaves of these plants. The result indicates that four species of the genus occurr in Taiwan. Most species are parapatric except the southern *T. jungchangi* sp. nov. *Taiwanaenidea collaris* and *T. strigosa* were found at a number of localities including Kuanwu (Hsinchu county), Suyuan (Ilan county), Meifeng and Tsuifeng (Nantou county). However, these species seemed to differ phenologically. Adults of *T. strigosa* started to appear in early spring (early March). More males were collected at that time than female. Although adults were collected in May or June, most late season specimens were females, presumable due to their greater longevity. Adults of *T. collaris* appeared during late spring and early summer. Most adults appeared during June. Some females were found in late August. Interestingly, adults of *T. jungchangi* sp. nov. were found at only two localities at different times. Adults collected from Tahanshan appeared in spring (March to May); however, those specimens collected from Peitawushan appeared during late summer (August). Color patterns of both populations were slightly different but constant. In elevation, most species live at elevations 2000–2500 m except southern *T. cheni* sp. nov. which occurs between 1000–1500 m. Central Taiwanese populations of *T. strigosa* live at elevations 2000–2500 m but northern populations occur at 1000–1500 m (Taoyuan and Ilan Counties).

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